UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/828,400	04/06/2001	Steven P. Poulsen	11983.0078	5178

7590 11/24/2003

Martin G. Linihan, Esq.
Hodgson Russ LLP
Suite 2000
One M&T Plaza
Buffalo, NY 14203-2391

EXAMINER	
WOZNIAK, JAMES S	

ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 11/24/2003

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/828,400	POULSEN ET AL.	
	Examiner	Art Unit	
	James S. Wozniak	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04/06/2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04/06/2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Detailed Action

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because several single drawing elements in Figs. 1-3, 7, and 9 have multiple reference numbers (for example: Fig. 2, Elements: 34 (64), 32 (24), and Fig. 3, Element 80 (128)). Also, Fig. 3, Element 30 should include a frame so as to clearly display that Element 30 consists of all of the elements in the figure.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: on Page 4, Line 14, the "buffer" referred to should be element --34-- not "32".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1, 2, 4, 6-10, 12, 13, 15, 17, and 18** are rejected under 35 U.S.C. 103(a) as being anticipated by U.S. Patent: 5,907,624 to Takada in view of U.S. Patent: 5,963,901 to Vähätalo.

Takada teaches the following:

With respect to **Claims 1 and 12**, Takada discloses:

A method and system for detecting a signal component *(detecting speech, Col. 5, Lines 57-64)*: in a composite signal *(speech plus noise signal, Col. 4, Lines 59-62)* comprising:

Accumulating samples of the composite signal to provide a series of frames each containing a plurality of signal samples *(compiling speech signals into frames of 256 samples each using a window function, Col. 4, Line 66- Col. 5, Line 6)*;

Transforming each frame to provide transform products in the frames *(FFT, Fig. 1A., Element 4, Col. 5, Lines 7-9)*;

Takada does not teach a method and system that:

- Analyzes each frame to determine the number of transform products having an amplitude above a threshold; and for each frame comparing that number to a validation range to determine if the frame contains the signal component, as recited in Claims 1 and 12.

However, Vähätalo suggests:

Analyzing each frame to determine the number of transform products having an amplitude above a threshold *(signal-to-noise ratio of individual frequency bands used in voice activity detection; comparison of these ratios to a threshold would be a common method of accomplishing voice activity detection, Col. 7, Lines 29-34)*; and

For each frame comparing that number to a validation range to determine if the frame contains the signal component *(suggested by Col. 7, Equation 14; adding all frequency bands together and comparing to a threshold is another method of analyzing all frequency bands in order to detect a signal component)*.

Takada and Vähätalo are analogous art because they are from a similar field of endeavor in speech recognition. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the method of obtaining individual frequency band signal-to-noise ratios and comparing each to a predetermined threshold as a means of speech recognition as suggested by Vähätalo with the speech detection/noise reduction system as taught by Takada as a means of identifying, on a frame by frame basis, if a speech signal is present. Therefore, it would have been obvious to combine Vähätalo with Takada for the benefit of obtaining a speech recognition capable of determining, for an individual frame, if speech is present by utilizing a predetermined threshold that can allow for speech detection in a variety of noise environments based on threshold setting, to obtain the invention as specified in Claims 1 and 12.

With respect to **Claim 2**, Takada shows:

The method according to claim 1, further including determining if the signal component is present in the composite signal based on the contents of a series of the individual frames *(speech detector checks for the presence of speech on a frame-by-frame basis by analyzing the individual, frame-particular transform coefficients provided by the FFT, Col. 5, Lines 24-27)*.

With respect to **Claim 4**, Takada shows:

The method according to claim 1, wherein transforming each frame is performed by a Fast Fourier Transform *(FFT, Fig. 1A, Element 4, Col. 5, Lines 7-9)*.

With respect to **Claim 6**, Takada discloses:

The method according to claim 1, wherein transforming each frame is performed by a windowed transforming *(compiling speech signals into frames of 256 samples each using a window function (Fig. 1A, Element 3), Col. 4, Line 66- Col. 5, Line 6).*

With respect to **Claim 7**, Takada discloses:

The method according to claim 1, wherein comparing the number of transform products includes determining if the number of transform products exceeds the computed spectral average of the transform products within the validation range *(comparing the mean power (frequency domain, spectral power) derived from transform products to find if it is greater than a predetermined threshold, Col. 5, Lines 57-64).*

With respect to **Claim 8**, Takada recites:

The method according to claim 1, wherein determining if the signal component is present comprises counting the number of frames containing the signal component until a predetermined number of frames is obtained indicating that the signal component is present in the composite signal *(input samples are placed into frames until a counter reaches a pre-selected value, Col. 12, Lines 46-53. These frames are then processed for determination of the presence of speech within the signal according to Takada as applied to Claim 1.).*

With respect to **Claim 9**, Takada shows:

The method according to claim 1, wherein the signal component is voice in a composite signal containing voice and non-voice components *(speech signal, Col. 1, Lines 44-48).*

With respect to **Claim 10**, Takada discloses:

The method according to claim 1, wherein the signal component is voice in a composite signal containing voice and network tone components *(pure tone estimates, Col. 1, Lines 48-50)*.

With respect to **Claim 13**, Takada discloses:

The system according to claim 12, further including a component to determine if the signal component is present in the composite signal based on the contents of the individual frames *(speech detector checks for the presence of speech on a frame-by-frame basis by analyzing the individual, frame-particular transform coefficients provided by the FFT, Col. 5, Lines 24-27)*.

With respect to **Claim 15**, Takada shows:

The system according to claim 12, wherein the processing component includes a component to window the transform of each frame *(compiling speech signals into frames of 256 samples each using a window function (Fig. 1A, Element 3), Col. 4-5, Lines 66-67, 1-6)*.

With respect to **Claim 17**, Takada shows:

The system according to claim 12, wherein the signal component is voice in a composite signal containing voice and non-voice components *(voiced and unvoiced sound, Col. 1, Lines 44-48)*.

With respect to **Claim 18**, Takada shows:

The system according to claim 12, wherein the signal component in voice is a composite signal containing voice and network tone components *(pure tone estimates, Col. 1, Lines 48-50)*.

5. **Claims 5, 14, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takada in view of Vähätalo, and in further view of U.S. Patent: 6,263,312 to Kolesnik et al.

Takada in view of Vähätalo discloses the speech detector/noise canceller featuring a speech-to-noise ratio comparison to a threshold as a means of speech detection as applied to Claims 1, 2, 4, 6-10, 12, 13, 15, 17, and 18, but does not teach:

- The overlapping of input signal frames as recited in Claims 5 and 14
- Method implementation using a program storage device as recited in Claim 20.

With respect to **Claims 5 and 14**, Kolesniket discloses:

The method according to claims 1 and 12 respectively, including overlapping the frames in conjunction with transforming each frame *(transforming samples using a windowing function (Fig. 1A, Element 3), also known as frame overlapping, Col. 5, Lines 1-5)*.

Takada, Vähätalo, and Kolesnik are analogous art because they are from a similar field of endeavor in audio signal processing and distortion correction. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the overlapping of frames as recited by Kolesnik with the windowing function as recited by Takada in view of Vähätalo since the method of windowing and overlapping frames are noted by Kolesniket to be the same function. Therefore, it would have been obvious to combine Kolesniket with Takada in view of Vähätalo since Kolesniket notes overlapping and windowing as performing the same function, to obtain the invention as specified in Claims 5 and 14.

With respect to **Claim 20**, Kolesniket shows:

A program storage device readable by a machine embodying a program of instructions executable by the machine to detect a signal component in a composite signal *(audio processing and distortion removal method implemented using program instructions contained on a machine readable medium, Col 17, Lines 26-31)* the instructions comprising:

Also, the above program storage device in combination with the speech detection system taught by Takada in view of Vähätalo as applied to Claim 1:

Accumulating a number of samples of the composite signal to provide a series of frames each containing a plurality of signal samples *(compiling speech signals into frames of 256 samples each using a window function, Col. 4-5, Lines 66-67, 1-6)*;

Transforming each frame to provide transform products in the frames *(FFT, Fig. 1A., Element 4, Col. 5, Lines 7-9)*;

Analyzing each frame to determine the number of transform products having an amplitude above a threshold *(Vähätalo: signal-to-noise ratio of individual frequency bands used in voice activity detection; comparison of these ratios to a threshold would be a common method of accomplishing voice activity detection, Col. 7, Lines 29-34)*; and

For each frame comparing that number to a validation range to determine if the frame contains the signal component *(Vähätalo: suggested by Col. 7, Equation 14; adding all frequency bands together and comparing to a threshold is another method of analyzing all frequency bands in order to detect a signal component)*.

Takada, Vähätalo, and Kolesnik are analogous art because they are from a similar field of endeavor in audio signal processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the ability to implement the speech detection method featuring the means of obtaining individual frequency band signal-to-noise ratios and comparing each to a predetermined threshold as a means of speech recognition recited by Takada in view of Vähätalo and applied to Claim 1 using a computer program as disclosed by Kolesnik to allow for a user controllable interface for properly configuring the system or simply

monitoring its performance. Therefore, it would have been obvious to combine Kolesnik with Takada in view of Vähätalo for the benefit of obtaining a speech detection system implemented using a computer program, furthering user control and monitored system performance, to obtain the invention as specified in Claim 20.

6. **Claims 3, 11, 16, and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takada in view of Vähätalo, and in further view of U.S. Patent: 6,044,068 to El Malki.

Takada in view of Vähätalo discloses the speech detector/noise canceller featuring a speech-to-noise ratio comparison to a threshold as a means of speech detection as applied to Claims 1, 2, 4, 6-10, 12, 13, 15, 17, and 18, but does not teach:

- Detection of the presence of a predetermined characteristic before determination of signal component is affirmed as recited in Claims 3 and 16
- Echo detection as recited in Claims 11 and 19

With respect to **Claims 3 and 16**, El Malki discloses:

The method according to claims 1 and 12, respectively, further including detecting the presence of a predetermined characteristic in the composite signal before the operation of determining the presence of the signal component can be performed *(detection of silence in an input frame of samples, Col. 2, Lines 43-47).*

Takada, Vähätalo, and El Malki are analogous art because they are from a similar field of endeavor in speech detection. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the method of silence detection as recited by El Malki with the speech detection/noise reduction system featuring the means of obtaining

individual frequency band signal-to-noise ratios and comparing each to a predetermined threshold as a means of speech recognition as taught by Takada in view of Vähätalo to adaptively react to a situation in which speech is not present; for example, allowing the speech detector to operate in a non-active state and thus save system power or applied to a method of echo detection. Therefore, it would have been obvious to combine El Malki with Takada in view of Vähätalo for the benefit of obtaining an energy efficient speech detection system capable of detecting echo, to obtain the invention as specified in Claims 3 and 16.

With respect to **Claims 11 and 19**, El Malki shows:

The method according to claims 3 and 16 respectively, wherein the signal component is voice and the predetermined characteristic is utilized to determine the presence of echo in the composite signal *(silence detection used to verify the presence of an echo in a speech signal and thus produce an echo estimate, Col. 2, Lines 43-55).*

Takada, Vähätalo, and El Malki are analogous art because they are from a similar field of endeavor in speech detection. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the method of echo detection utilizing the detection of silence within a speech signal with the speech detection/noise reduction system featuring the means of obtaining individual frequency band signal-to-noise ratios and comparing each to a predetermined threshold as a means of speech recognition as taught by Takada in view of Vähätalo to detect speech-degrading echo that can occur in the communication channels of the system taught by Takada. Therefore, it would have been obvious to combine El Malki with Takada in view of Vähätalo for the benefit of obtaining a speech detection/noise cancellation

system in which noise and echo can be detected and, if proper means added, reduce or eliminate these signal degrading elements, to obtain the invention as specified in Claims 11 and 19.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- U.S. Patent: 5,953,381 to Tsukahara- discloses a noise canceller that divides an input signal into frames, obtains transform coefficients, and compares a mean transform coefficient value to a threshold in determining the proper level of noise suppression.
- U.S. Patent: 6,480,823 to Zhao et al- teaches a means of detecting a speech signal in noise that divides the input signal into frames by utilizing a hamming window, transforms the input using an FFT converter, and utilizes a histogram feature that counts the number of times frame energy level surpasses a predetermined noise energy level threshold in determining the presence of speech within a signal.
- U.S. Patent: 5,920,834 to Sih et al- teaches an echo detector/canceller that divides the input signal into frequency bands and generates individual signal-to-noise ratios for each.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (703) 305-8669. The examiner can normally be reached on Mondays-Fridays, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Talivaldis Ivars Smits can be reached at (703) 306-3011. The fax/phone number for the Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center receptionist whose telephone number is (703) 306-0377.

James S. Wozniak
11/18/2003

TĀLIVALDIS IVARS ŠMITS
PRIMARY EXAMINER